Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Expanding Flexible Use of the 3.7 GHz to 4.2 GHz Band	)	GN Docket No. 18-122
Report on The Feasibility of Allowing Commercial Wireless Services, Licensed or Unlicensed, to Use or Share Use of the Frequencies Between 3.7 - 4.2 GHz	)	

COMMENTS OF GCI COMMUNICATION CORP.

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TABLE OF CONTENTS

Page

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GCI Communication Corp. (f/k/a/ General Communication, Inc.) ("GCI") submits the following comments in response to the Office of Engineering and Technology ("OET"), International and Wireless Telecommunications Bureaus' (collectively with OET, the "Bureaus'") Public Notice ("Notice") seeking comment for an upcoming Federal Communications Commission ("FCC" or "Commission") report (the "Report") on the feasibility of allowing commercial wireless services to use or share use of the 3.7-4.2 GHz band ("3.7 GHz Band" or "C-Band").[1] Specifically, the Notice asks how the Bureaus should assess the possible impacts of band sharing on incumbent users in the C-Band, and how sharing might be accomplished without causing harmful interference to these incumbent users.[2] In these comments, GCI incorporates its previously-filed comments in other relevant FCC proceedings,

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[1] *Office of Engineering and Technology, International, and Wireless Telecommunications Bureaus Seek Comment For Report on the Feasibility of Allowing Commercial Wireless Services, Licensed or Unlicensed, to Use or Share Use of the Frequencies Between 3.7-4.2 GHz*, DA 18-446, Public Notice¸ GN Docket No. 18-122 (rel. May 1, 2018) ("Notice").

[2] *Id.* at 1.

including those filed in GN Docket No 17-183 (*Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*),[3] RM-11791 (*Broadband Access Coalition ("BAC") Petition for Rulemaking re: Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3700-4200 Band*)[4] and RM-11778 (*Fixed Wireless Communications Coalition ("FWCC") Request for Modified Coordination Procedures in Bands Shared Between the Fixed Service and the Fixed Satellite Service*),[5] and offers the following information for the Bureaus' consideration in preparing the Report:

I. INTRODUCTION AND SUMMARY

GCI, through its subsidiaries, covers more of Alaska's population through its telecommunications network than any other provider in the state. GCI's longstanding familiarity with the unique demands of the Alaskan marketplace and environment, its deep resources in Alaska, and its understanding of the needs of Alaskans, have all contributed to the development and deployment of the largest broadband network in Alaska. As GCI has found, providing broadband service to Alaska is particularly challenging due to "its remoteness, lack of roads, challenges and costs associated with transporting fuel, lack of scalability per community, satellite and backhaul availability, extreme weather conditions, challenging topography, and short construction season."[6] Therefore, GCI must utilize a variety of technologies in order to provide

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[3] *See* Reply Comments of General Communication, Inc., GN Docket No. 17-183 (filed Nov. 15, 2017) ("GCI Mid-Band NOI Reply Comments"); Comments of General Communication, Inc., GN Docket No. 17-183 (filed Oct. 2, 2017) ("GCI Mid-Band NOI Comments").

[4] *See* Comments of General Communication, Inc., RM-11791 (filed Aug. 7, 2017) ("GCI BAC Comments").

[5] *See* Reply of General Communication, Inc., RM-11778 (filed Jan. 24, 2017) ("GCI FWCC Reply").

[6] *Connect America Fund; Universal Service Reform – Mobility Fund; Connect America Fund - Alaska Plan*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 10139, 10162,¶ 72 (2016) ("*Alaska Plan R&O*") (citing *Connect America Fund et al.*, Report and Order

dependable services, and often must do so in innovative ways. This includes using fixed satellite services ("FSS") in conjunction with its terrestrial mobile and fixed wireless networks, largely in areas where fiber deployment is not possible.

GCI relies on the 3.7 GHz Band in order to provide downlink FSS operations, and has a very long history of utilizing the C-Band to provide broadband and video communications services throughout Alaska. This band is particularly important to GCI due to the critical and important services provided over this spectrum. For instance, many of GCI's C-Band sites serve customers residing in the most rural and remote areas of the country that rely exclusively on satellite technology for the provision of basic telephone service, medical service, and distance-learning. Federal agencies, such as the Federal Aviation Administration ("FAA"), for example, also depend on GCI's operations in this spectrum to assist pilots in determining local weather conditions throughout the state, and US military operations have been utilizing commercial satellite operations for many years. Many of these critical services, if interrupted, could result in life-threatening situations.

The Notice asks how "sharing might be accomplished . . without causing harmful interference to Federal and non-Federal users already operating in the band"[7] and for other considerations with respect to sharing in the band. The Commission has initiated a separate proceeding to explore potential sharing opportunities, among other changes to the rules governing the 3.7 GHz Band.[8] In response, several parties have submitted potential sharing and

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and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17829,¶ 507 (2011)). ("*USF/ICC Transformation Order"*), *aff'd sub nom. FCC 11-161,* 753 F.3d 1015 (10th Cir. 2014)).

[7] Notice at 2.

[8] *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, FCC 17-104 (rel. Aug. 3, 2017) ("*Mid-Band NOI*").

repurposing/repacking solutions on the record.[9] At this time, GCI has not found that the proposed 3.7 GHz sharing proposals have adequately addressed the need for a rigorously defined and executed interference mitigation plan that ensures continuity of service for earth station operators, particularly in light of the increased sensitivity of earth station receivers to the presence of coherent and incoherent noise conditions.

II. THE C-BAND IS USED FOR THE PROVISION OF CRITICAL BROADBAND SERVICES TO CONSUMERS, BUSINESSES, AND GOVERNMENT ENTITIES

In order to assess the possible impacts of sharing on incumbent users in the band, it is important for the Bureaus to have a comprehensive understanding of the types of services and operations that currently rely on the C-Band.

GCI uses the 3.7 GHz band for middle-mile backhaul services[10] as well as for traditional video content distribution. This band is particularly important to GCI, and other FSS earth station operators in Alaska, that face significant and unique challenges in providing telecommunications services to the state, including limited satellite coverage, increasing capacity, and interference issues. This spectrum helps alleviate some of these concerns, as it enables GCI to provide critical and important services via 2G and LTE-over-Satellite data services, among other technologies that GCI uses to provide services to its customers via the C-

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[9] *See, e.g.*, Letter from Karis A. Hastings, Counsel for SES Americom, Inc. to Ms. Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, Feb. 9, 2018 (updating the Intel/Intelsat proposal and adding SES as a signatory); Comments of Intelsat and Intel, GN Docket No. 17-183, at 12 (filed Oct. 2, 2017) Comments of CTIA-The Wireless Association, GN Docket No. 17-183, at 12 (filed Oct. 2, 2017); Comments of T-Mobile USA, GN Docket No. 17-183, at 15 (filed Oct. 2, 2017); Comments of Verizon, GN Docket No. 17-183, at 19 (filed Oct. 2, 2017) ("Verizon Mid-Band NOI Comments").

[10] For backhaul purposes, when data is requested by a source ("SRC") host, it is delivered to the region's C-Band earth station and is uplinked via the 6 GHz Band to the satellite and then downlinked, translating the frequency from 6 GHz to 4 GHz for reception at the receiving earth station. Transponders assist by unlinking (at 6 GHz) and downlinking (at 4 GHz) the data response.

Band. Below are a number of examples of services provided by GCI across the 3.7 – 4.2 GHz spectrum:

Critical Long-Distance Services. GCI offers Measured Toll Service ("MTS") for consumers and businesses using its licensed C-Band spectrum. For many remote villages in the northern, western, and interior regions of Alaska, this is oftentimes the only communications link to the "outside world," allowing these residents to contact state troopers and other emergency officials at all times, but especially in critical situations. GCI also provides long-distance private line (special access) services to businesses, native corporations, and local, state and federal governments. These operations service FAA circuits and other government agency circuits, helping to ensure that the most critical and secured communications travel from and reach their intended destination. Any interference to such circuits could result in the potential for injury or loss of life.

Alaska Plan.[11] The C-Band plays a critical role in GCI's contribution to the Alaska Plan: GCI uses this spectrum to deliver middle-mile capacity with the last-mile LTE service – a critical initiative to provide needed services to under and under-served areas.[12] GCI has already allocated specific spectrum in Dutch Harbor, Barrow and other served and to-be-served sites, and GCI currently has approximately 1.25 transponders (36 MHz each) dedicated to this cause with plans to increase spectrum-use in the near-term. If GCI's access to the C-Band were to be

[11] In 2016, the Commission adopted a plan to help extend and upgrade Alaska's broadband service to support a large number of underserved and unserved communities (the "Alaska Plan"). Objectives of the Alaska Plan include, but are not limited to, introducing broadband service to over 36,000 new residents at speeds of 10/1 Mbps and upgrading almost 70,000 residents to 25/3 Mbps, which requires GCI to deploy 4G LTE or better service to more than 100,000 remote Alaska residents. *Alaska Plan R&O*, ¶¶8, 73.

[12] *See Wireless Telecommunications Bureau Approves Performance Plans of The Eight Wireless Providers That Elected to Participate in the Alaska Plan*, Public Notice, WC Docket No. 16-271, DA 16-1419, Appendix A, page 6 (rel. Dec. 21, 2016).

modified or interrupted in any way, it could jeopardize GCI's ability to provide services consistent with the obligations it assumed under the Alaska Plan.

FAA Assistance. Due to the enormous size of the state and lack of road infrastructure, the use of small aircraft for day-to-day travel is common in rural Alaska. Unfortunately, due to weather, mountainous terrain, and the lack of adequate mapping, travel by small aircraft comes with inherent risk. Pilots routinely find themselves in rough weather and must decide whether to turn around and try again later – at significant expense and inconvenience to their passengers – or face the increased risk of flying in potentially unsafe conditions. For over a decade, GCI has been working with the FAA on a program that provides real-time weather-camera information to pilots using the GCI satellite network for middle-mile backhaul. Based on data compiled by the FAA, this program has reduced weather-related aviation incidents in Alaska by *85 percent*, and has reduced how often pilots must turn a plane around due to weather by *66 percent*.[13]

Military Reliance. In addition, the U.S. military has "long purchased commercial satellite communications to augment its own capacity"[14] and has had a recent push in integrating its satellite systems with commercial satellite systems, including the C-Band, in order to increase capacity, resiliency, and even security.[15] The Army utilizes both military and commercial satellites to provide "interoperable high-speed, high-capacity connectivity, so Soldiers can communicate across vast distances and in austere locations and terrains, virtually anytime,

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[13] GCI, News Release, *Weather Camera Program Protects Pilots, Saves Lives in Alaska* (Apr. 19, 2017) https://www.gci.com/about/newsreleases/weather-camera-program.

[14] Andrea Shalal, *Commercial Satellite Industry Seeks Growing U.S. Military Demand*, REUTERS (Mar. 9, 2016) https://www.reuters.com/article/us-usa-military-satellites/commercial-satellite-industry-sees-growing-u-s-military-demand-idUSKCN0WB20F.

[15] *See, e.g.*, Kris Osborn, *Air Force Explores Commercial Satellite Resiliency*, DEFENSE SYSTEMS (Jan. 6, 2017) https://defensesystems.com/articles/2017/01/06/satellite.aspx; Peter B. de Selding, *U.S. Military Rebounding as a Commercial Satellite Customer*, SPACE NEWS (Nov. 8, 2016) http://spacenews.com/u-s-military-rebounding-as-a-commercial-satellite-customer/.

anywhere."[16] This commercial use "support[s] and complement[s] the Army's Warfighter Information Network-Tactical ("WIN-T") network and architecture and help[s] increase the operational reach and situational awareness of the entire force."[17] Commercial satellites also provide important redundancy for security purposes: for example, the military adds commercial satellite receivers to vehicles and other equipment to back up their own operations in the event they are hacked or degraded.[18]

Telehealth. Through its "ConnectMD" network, GCI supports the delivery of telemedicine services such as teleradiology, remote patient monitoring, medical network solutions, and live video-conferencing to customers in Alaska.[19] These C-Band sites provide backhaul to government health providers such as North Slope Borough Department of Health and Social Services,[20] as well as Tribally-operated, non-profit health and social services organizations like the Arctic Slope Native Association.[21] These services improve healthcare in areas that traditionally have few physicians and even fewer medical specialists in a variety of medical fields, including audiology, cardiology, dental, family medicine, neurosurgery, ophthalmology, pediatrics, psychiatry, and women's health. Importantly, ConnectMD also allows participating communities to accommodate patients with sudden symptoms, often

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[16] U.S. Army, Satellite Communications, http://peoc3t.army.mil/wint/satcom.php (last visited May 30, 2018).

[17] *Id.*

[18] Andrea Shalal, *Commercial Satellite Industry Seeks Growing U.S. Military Demand*, REUTERS (Mar. 9, 2016) https://www.reuters.com/article/us-usa-military-satellites/commercial-satellite-industry-sees-growing-u-s-military-demand-idUSKCN0WB20F.

[19] *See* GCI ConnectMD, http://www.connectmd.com/ (last visited May 30, 2018).

[20] The North Slope Borough, http://www.north-slope.org/departments/health-social-services (last visited May 30, 2018).

[21] Samuel Simmonds Memorial Hospital, http://www.arcticslope.org/about (last visited May 30, 2018).

developing treatment plans without the need for costly hospitalization. In most instances, the ConnectMD network is the only way that rural Alaskans may gain access to such specialists, and if GCI's access to the C-Band is interrupted in any way, these programs, and the residents who rely on them, will be impacted.

Long-Distance Learning. GCI's SchoolAccess network provides broadband access, video conferencing and state-of-the-art digital tools to schools and libraries in rural and underserved regions of the United States.[22] This program focuses on K-12 school and library environments and currently serves more than 100,000 patrons.[23] The SchoolAccess services have become an essential part of educating students in rural areas, with its video service logging more than 2.25 million minutes each year in Alaska, New Mexico, and Montana.[24] The program allows students in rural and remote areas to participate (virtually) in online music performances, leadership groups, state-wide programs and competitions, including Battle of Books, a statewide reading motivational and comprehension program; spelling bees; and Alaska Robotics, the state-level science and engineering fair.[25] The opportunities do not end there: distance-learning has not only increased academic, athletic and social collaboration between the district's geographically isolated students, but has also led to improved test scores among its students, providing a greater opportunity for these students to attend college.[26]

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[22] GCI SchoolAccess, http://www.schoolaccess.net/public-general/services (last visited May 30, 2018).

[23] GCI SchoolAccess, About, http://www.schoolaccess.net/public-general/about (last visited May 30, 2018).

[24] *Id*.

[25] *Id.*

[26] *Id.*

III. THE 3.7 GHZ BAND PRESENTS UNIQUE TECHNICAL CHALLENGES WITH RESPECT TO SHARED USE BETWEEN FSS AND COMMERCIAL WIRELESS SERVICES

Band sharing in the 3.7-4.2 GHz band is, on the surface, problematic due in large part to the actual technology utilized by FSS-receive systems. As an initial matter, GCI uses the entire 500 MHz C-Band spectrum allocation to serve it's C-Band satellite network and, in the few locations where it uses just less than the full 500 MHz, relies on the flexibility afforded by the FCC's rules, such as the full-band, full-arc coordination policy, to efficiently shift frequencies and satellites in the event of a transponder or satellite failure or market competition (resulting in capacity cost reductions). It is difficult, if not impossible, to maintain a competitive market position in the event that the band permits shared used between FSS and commercial wireless services.

In addition, as the FCC has recognized, "FSS earth station deployment in the 3.7-4.2 GHz Band is much more significant" than deployment in other bands where mobile, fixed and FSS services coexist.[27] The sheer quantity of FSS deployment coupled with the unique operating needs of these services result in specific challenges to mobile and fixed uses that may not be present in other bands.[28] For instance, the received signal level ("RSL") at the satellite antenna is extremely small, such that very sensitive low-noise amplifiers ("LNAs") are required to recover the signal and discriminate it from the thermal noise floor. Accordingly, the presence of even small amounts of external, intentional radiator energy can easily overwhelm the input signal limits of an LNA and saturate it.[29] In short – even the smallest levels of interference could be

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[27] *Mid-Band NOI* ¶ 20.

[28] *See id.*

[29] Received signals from geostationary satellites are dramatically lower than those observed in terrestrial microwave solutions. This requires the use of ultra-sensitive low noise amplifier

harmful to the provision of services over the C-Band. Indeed, GCI requires clear, unobstructed access to and from the target satellite in order to achieve reliable operation of circuits delivered via satellite. Alternatively, if saturation of the input does not occur, the presence of interference increases the noise density and causes a degradation of the signal quality, rendering the signal unrecoverable.

Once interference occurs, the mitigation of that interference can become very difficult to realize because multiple terrestrial transmitters could operate in the same region, with spectrum re-use. Service-affecting interference events occur in existing satellite networks as new antennas come into networks or fall out of performance specifications. Under those conditions, identifying the source of the interference, particularly if the operation is intermittent or time-of-day specific, could take days or weeks, and requires expensive, complex triangulation systems. Such an occurrence would effectively cripple the critical services already being provided in the band, resulting in a period of outage for GCI's customers who rely on the various services described herein as their only means of connectivity to emergency services.

IV. INCUMBENT FSS OPERATIONS MUST BE PROTECTED FROM INTERFERENCE IF SHARING IS PERMITTED IN THE 3.7 GHZ BAND

The impact to the important and critical programs as a result of sharing in the band could be catastrophic without the right protections in place. As the Notice infers, sharing with licensed and/or unlicensed operations must be accomplished "without causing harmful interference to Federal and non-Federal users already operating in this band."[30] GCI wholeheartedly agrees that interference protections are essential to any sharing plan.

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components in order to overcome thermal noise. The presence of intentional, in-band interferers can easily swamp the input power threshold of an LNA.

[30] Notice at 2.

In order to defend incumbent users from harmful interference, certain protections and considerations should be incorporated into any sharing arrangement. First, incumbent FSS operators must have primary access to the spectrum.[31] Terrestrial fixed and mobile wireless operations should have secondary rights to the spectrum, and prospective new entrants should bear the burden of demonstrating that their operations will not result in harmful interference or other interruptions to C-Band FSS services, before they may introduce new operations into the band.[32] Second, the FCC should explore other efforts, such as protection zones, that can help protect FSS services. GCI briefly addresses certain proposals in the *Mid-Band NOI* record aimed at mitigating interference in a sharing scenario:

Exclusion or Protection Zones & Other Technical Limits. As an initial matter, GCI agrees that the use of exclusion or protection zones would be a "complicated solution"[33] but could be achievable with the proper parameters.[34] In addition, the FCC should also consider, power limits and timely enforcement of restrictions to eliminate the source of interference immediately in the event such a situation occurs.[35] While GCI is still examining the necessary parameters for effective protection zones in the 3.7 GHz Band, it agrees that there would need to

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[31] This primary access should apply to incumbent FSS operators' existing and future facilities. *See* Comments of Nokia, GN Docket No 17-183, at 12 (filed Oct. 2, 2017) ("Nokia Mid-Band NOI Comments").

[32] *See* Comments of the Content Companies, GN Docket No 17-183, at 5-6 (filed Oct. 2, 2017); Comments of Satellite Industry Association, GN Docket No. 17-183, at 5 (filed Oct. 2, 2017) ("SIA Mid-Band NOI Comments").

[33] Verizon Mid-Band NOI Comments at 19.

[34] *Id.*

[35] Comments of American Cable Association, GN Docket No. 17-183, at 19-20 (filed Oct. 2, 2017).

be significant separation distances from terrestrial and mobile transmitters[36] and, at this initial stage, suggests that the means of determining the extent of these zones would likely be similar to the methods used to previously determine band-sharing between C-Band FSS receive operations and C-Band fixed service ("FS") (microwave) transmit/receive operations at 3.7-4.2 GHz.

Spectrum Access Database. Parties have suggested that the FCC utilize a database-supported authorization framework for sharing in the 3.7 GHz band, similar to that adopted (but not yet implemented) for the 3.5 GHz CBRS band.[37] GCI reiterates its concerns with adopting an untested method for the C-Band at this time,[38] and many commenters on the record echo these concerns.[39] While GCI remains concerned with relying on a SAS or other untested database coordination policy for interference prevention, in the event the FCC elects to implement such an approach, GCI submits that no wireless base station and/or fixed or mobile end user device should be permitted to access any of the shared C-Band spectrum without first assuring the SAS that it is operating outside of a set exclusion zone and/or continuously communicating with the SAS with the understanding that service shall be immediately terminated with the loss of SAS connectivity.

In sum, for sharing to be feasible in the 3.7 GHz Band, incumbent FSS operations must be protected and allowed to continue to operate their services without interruption.

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[36] *See* Comments of National Association of Broadcasters, GN Docket No. 17-183, at 6-7 (filed Oct. 2, 2017); Comments of Comsearch, GN Docket No. 17-183, at 3-4 (filed Oct. 2, 2017) ("Comsearch Mid-Band NOI Comments"); SIA Mid-Band NOI Comments at 37-39; *see also* Nokia Mid-Band NOI Comments at 11.

[37] *See, e.g.*, Comsearch Mid-Band NOI Comments at 3-4; Comments of Motorola Solutions, GN Docket No. 17-183, at 3 (filed Oct. 2, 2017).

[38] *See* GCI Mid-Band NOI Comments at 15-16.

[39] *See, e.g.*, Comments of Ericsson, GN Docket No. 17-183, at 6-7 (filed Oct. 2, 2017) (determining that such a database approach would not be advisable since they are still in development and have not yet been tested); SIA Mid-Band NOI Comments at 40-41 (recognizing that the untested 3.5 GHz approach is not suited for the 3.7 GHz Band).

V. CONCLUSION

FSS operators such as GCI have relied upon unencumbered access to the entire 500 MHz offered in the 3.7-4.2 GHz band for many years to provide critical services to customers in remote or rural areas. Modifying the current 3.7 GHz landscape by introducing commercial wireless services without additional protections would severely impact GCI's FSS operations, and the customers that rely on them the most. Accordingly, in the event that a sharing solution is contemplated for the 3.7 GHz Band, the significant critical incumbent uses in these bands must be recognized and suitable protections for these services must be incorporated in any adopted sharing framework.

Respectfully submitted,

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